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ABSTRACT

This document reports the findings of a study which used the Delphi Technique to survey the attitudes of a representative group of professionals toward developments in the curriculum, the design of instructional materials, and the use of new technology by classroom teachers at the kindergarten through ninth grade levels. Participants included classroom teachers, school library media specialists, administrators, college education/library media faculty, and representatives from state and national government agencies and associations. The respondents discussed the skills and subjects that will be emphasized in schools over the next 10 years in the context of their own predictions for the future world environment, and described their visions of the classroom in the year 2000. Participants also indicated the skills and subjects that will be emphasized over the next decade and into the following century, and considered which new technologies will play an important role in the classroom by the year 2000. Finally, participants expressed concern over equal access to technology in the future, and also expressed varying degrees of enthusiasm about the growth of educational technology. Opinions were gathered in 3 rounds; 78 educators participated in the first round and 50 remained for the final round. A diagram depicting a classroom as it might look in the year 2000 is included. (EW)

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PREPARING SCHOOLS FOR THE YEAR 2000

The Impact of Technology on America's Classrooms in the Decade Ahead

A National Study Sponsored by
Society For Visual Education, Inc.

In Cooperation with the
Association for Childhood Education International

June, 1988

Study prepared by Peggy O'Donnell, Research Consultant

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Foreword

Society for Visual Education, Inc. (SVE), in cooperation with the Association for Childhood Education International (ACEI), has completed a year-long qualitative study probing opinions of education professionals on future trends in education at the kindergarten through ninth grade levels.

The major purpose of the study was to survey the attitudes and opinions of these specialists on the future use of technology in the classroom. Participants were asked to forecast developments in the curriculum, in instructional materials and in the use of technology by classroom teachers. We sought this information to help us understand the needs of students and educators better, and to identify opportunities for development of instructional methods and materials.

The issues raised by the participants were reviewed through a series of three questionnaires. The areas in which they reached consensus provided the basis for a number of conclusions, which are summarized in the following pages.

The responses that we received did not indicate that we should expect a radical change in our education system. Teachers and books are not going to become obsolete in the decade ahead. However, our participants did point to a considerable agenda of challenges. As important, they conveyed a true sense of excitement, a tremendous feeling of optimism about the future of technology in education.

Our hope is that this study will prove to be a practical, thoughtful contribution to the body of information required of the planning process.

Suzanne T. Isaacs
President and Chief Executive Officer
Society For Visual Education, Inc.

Introduction

This study was conducted by Society For Visual Education, Inc., with the cooperation of the Association for Childhood Education International. It was carried out from March to December, 1987.

The major purpose of the study was to assess the impact of new technology on tomorrow's classrooms by surveying the attitudes of a representative group of professionals regarding the use of this technology in education. The group was asked to forecast developments in the curriculum, the design of instructional materials and the use of new technology by classroom teachers at the kindergarten through ninth grade levels.

The study was also intended to provide an understanding of the concerns of today's teachers and school library media specialists, and to support the betterment of education for America's students. The results provide useful hypotheses about future developments in teaching and the use of educational resources.

Methodology, Design of the Study

The study used the Delphi technique. To develop a forecast of future trends in a particular field, this technique draws from informed opinions to reach consensus on certain issues, within a defined time frame. This process was originated by the Rand Corporation in the 1950's to gather opinions on critical defense concerns. It has been widely employed in the fields of health, education and business.

A Delphi study is conducted through a series of questionnaires sent to participants who represent various viewpoints on or experience with the topic under discussion. The panelists respond to each round of questionnaires and these responses are used to structure subsequent rounds.

Since the topic of this study was the use of new technology in elementary and junior high education, the issues centered on the K-9 curriculum, instructional materials and the role of technology in the classrooms of the year 2000.

Round I

In the first round, the questions were open-ended in order to elicit the widest possible range of responses. The participants were asked to address three questions and to provide a rationale for their answers.

These questions were:

1. In reviewing the K-9 curriculum, what are the top five skills and/or subjects that are likely to be emphasized in the next ten years? (List no more than 5.)
2. What types of instructional materials will be essential in the classroom and in the school media center in the mid-90's? (List no more than 5.)
3. In what ways will classroom teachers use new technology as a teaching tool in the mid-90's? (List no more than 5.)

Round II

In Round II, statements were constructed representing the range of responses from Round I, and respondents were asked to rate the extent to which they agreed or disagreed with each statement. In this way, all opinions were presented for evaluation by all respondents. In addition, they were asked to indicate whether each statement was true now, would be true in the future, or would never come to pass.

The primary purpose of the second round was to refine the issues raised in the first round and to narrow, by consensus of the respondents, the major trends to be considered in the final round.

Round III

The results of Round II were organized into a brief summary report. The respondents were asked to answer several final questions to clarify or reach a definite consensus on issues previously unresolved.

Limitations of the Study

A Delphi study gathers opinions on future trends from people experienced in a particular field of study. By definition, the findings of this research are qualitative and diagnostic. They should be used only to develop hypotheses about the role of technology in the classroom of the future and the kinds of materials and programs that will be needed to support this role.

The Delphi Study Universe

The participants included classroom teachers, school library media specialists, administrators, college education/library media faculty, and representatives from state and national government agencies and associations. No attempt was made to gather all possible opinions. The participants were selected because they covered a spectrum of experience and knowledge. Seventy-eight educators responded to the first round; 50 went through all three rounds.

Of these 31 women and 19 men, two had 5-10 years of experience, 19 had 10-20 years, 27 had more than 20 years, and two were retired. They represented 27 states and all regions of the United States.

Delphi Study Respondents:	Number
Classroom teachers	13
School library media specialists	11
College faculty members (education or library science)	12
Representatives of state education departments	9
Consultants	3
Representatives of national education organizations (ERIC, NCLIS)	2
Total	50*

*This number refers to those who completed the third round of the study. A total of 78 respondents participated in one or more rounds.

General Conclusions on Major Trends in the Use of Technology in Education

In reviewing the findings of the Delphi study, the impact of new technology on the educational process fell into several areas. This section provides a summary of respondents' most important opinions about the curriculum, the classroom and teachers in the next decade.

The Society of the Year 2000

The respondents discussed the skills and subjects that will be emphasized in schools over the next ten years in the context of their own predictions for the future world environment.

In general, these professionals said that today's students must be educated to face a world that is becoming increasingly complex: a highly technical and information-oriented society where individuals must absorb an explosion of information as well as new theories and discoveries. The rapid advance of computer technology has fueled this process, making vast amounts of information available to those who have learned to use a computer.

One respondent commented:

> *"Teachers must help students acquire skills, values and knowledge to deal with this community of the future. Society will become increasingly dependent on all types of technology, and students must be prepared to manage and control it."*
> – School libary media specialist, Nebraska

The participants also described a world that is fast-moving, constantly shrinking, and influenced by a variety of cultures that we don't know very well. Skills such as comprehension, communication and cooperation were seen as crucial.

One respondent commented, "*..we're in close quarters on 'Spaceship Earth'.*"

Another stated:

> *"Critical thinking skills allow students to pursue new ideas, solve problems and make better choices in an ever-shrinking world."*
> – Classroom teacher, North Carolina

Finally, it was felt that children seem to grow up much faster today and are exposed to issues such as sex, drugs, the threat of AIDS, etc., through both television and real life at a relatively early age. To help students understand and deal with these issues, participants viewed coping skills as an important area of education.

A typical comment was:

> *"If we are to deal with television as a 'school' of violence and hate, we must teach respect for life, caring and cooperation."*

Overall, participants believed that students must become literate, critical thinkers – informed to meet a greater variety of challenges in a more technological world.

The Classroom of the Year 2000

Most participants described the classroom of the year 2000 as superior to today's classroom, with a number of computer stations and VCR's allowing the teacher to direct a variety of individual and small group activities simultaneously.

Here are two respondents' visions for classrooms of the future:

> *"Schools will be smaller, more home-like. Classrooms may look like a living room with TV's and VCR's and computers set in alcoves."*
> – Classroom teacher, Missouri

> *"The student won't have a notebook, (but) a small computer to record notes, write papers, outline reports. This will mean a different 'desk' area for each student. The teacher's desk will have a large collection of laser/optical disks to fit all subject areas. Computers will line the perimeter of the room."*
> – College professor, Pennsylvania

Technology is expected to have great impact on the classroom of the future, not only in terms of what the classroom will look like, but also on the activities that will take place in it. The computer and interactive video, in particular, are expected to allow more small group projects emphasizing cooperation, critical thinking and problem solving. Independent learning projects will let children learn at their own pace. Ideally, the teacher will monitor all these activities centrally, intervening when necessary.

This high-tech classroom will require students to become "computer literate" at a relatively early age. Responses varied widely as to the specific age at which computer literacy should be attained, but 50% of the panelists felt basic computer skills should be acquired by the fourth grade, and 90% felt that students should have these skills by the sixth grade.

The teacher, as well as the student, is expected to benefit from technological advances. New technology will help teachers in their presentations and will enhance the teacher's effectiveness by making more time available for individual students. The teacher will also have access to more resources through on-line data bases on CD ROM. Video and telecommunications will provide additional resources, such as special demonstrations of difficult concepts and outstanding teacher presentations. Special interest courses will become feasible for individual students and small groups. Computerized records will allow teachers to monitor students' progress more easily.

While respondents felt that technology will play an important role in the classroom of the future, they also stated that the teacher will remain in control of the classroom. It is the teacher's creative use of new technology that will enhance the teaching and learning process, but books and other traditional learning materials such as filmstrips and audio tapes will also continue to be important.

One respondent gave this view of the impact of new technology on the classroom of the future:

> *"Technology will help bring the world much closer to all classrooms. The learning environment will not be the classroom, but the world."*
> – Educational consultant, Montana

The Curriculum in the Year 2000

The first question asked participants to discuss what would be taught in grades K-9 in the next decade. Important skills for the future were summarized as the four Cs: Comprehension, Critical Thinking, Communication, Coping.

Again and again the panelists referred to the need for students to acquire skills in communication (written and oral), the ability to read with understanding and the ability to meet complex challenges through problem solving and critical thinking skills. Another major need is computer skills – the ability to locate, access and manage information.

One educator wrote:

> *"As we move from an industrial society to an information-based society, we must learn all the skills – analyzing, evaluating and managing information."*
> – State Department of Education official, Maryland

The specific subjects most often mentioned as important in the classroom of the year 2000 were:

- **The language arts . . .**
in particular, reading. One panelist said: *"There must be a greater emphasis on integration of reading, language arts, listening and writing if we are to understand and use language effectively. Students need skills in listening, speaking, reading and writing."*

- **Math and science . . .**
important in themselves, but also seen as areas in which problem solving skills are developed.

- **Health, fitness and sex education . . .**
a major focus, driven by concern about the threat of AIDS, drug abuse and the increase of teen pregnancies. Medical studies have shown that life-long fitness must begin in childhood, and participants felt that good health habits must be taught as part of the curriculum. Several pointed out the need to help students develop their social skills by helping them to understand themselves better.

- **Humanities and the arts . . .**
received only a few mentions. One panelist wrote of the *"importance of literature, not only in language arts, but other disciplines as well because students need exposure to the most effective sources of human expression in order to develop into a literate, thinking society."*

- **Social studies (current events, geography, history) . . .**
also received very few mentions. When asked in the last round to comment on these omissions, most participants agreed that little exposure to these subject areas could result in serious cultural deprivation. Only a few, however, believed that the humanities and social studies would be a prominent part of the curriculum in the year 2000.

Teaching Tools of the Decade Ahead

Traditionally, teachers have used books, paper, pencils, workbooks and the chalk board to teach the curriculum. Since the 50's, a variety of audio-visual materials have been added. More recently, the use of new tools and materials has increased. One of the purposes of this study was to assess the usage of all of these in the next decade.

Delphi participants listed microcomputers and VCR's much more often than more traditional tools. They agreed that though 50% of classroom time will be spent with the teacher, 25% of classroom time will be spent using microcomputer and video technology.

Interactive video was viewed as an instructional tool with great potential, but if this potential is to be realized, educational software must be improved. Respondents suggested more creative and innovative material, user-friendly software in a standardized format compatible with all systems,clear instructions, high quality content and software geared to all areas of the curriculum.

One panelist wrote:

> *"Microcomputer programs should teach as a reinforcement of basic skills (drill and practice) and provide simulation exercises, games and word processing capability to improve writing and editing skills."*
> – College professor, Minnesota

Another classroom teacher suggested:

> *"Video can be used to record class performances, helping students to develop communication and personal skills."*

The CD ROM format will play a major role in providing access to large amounts of data, and video is expected to become more pervasive.

Though new technology has a significant role to play in the next decade, books and supportive audio-visual materials will remain important and take at leat 20% of the students' time. Educators believe that books are vital to good language arts skills, and will continue to provide a resource for research and information. The respondents did not expect to see traditional materials replaced by new technology in the foreseeable future.

Equal Access to New Technology

Although the respondents, for the most part, liked projecting into the future and commenting on the various wonders that can be achieved through new technology, a concern was expressed by some that students who don't enjoy technology's benefits will face problems.

One educator said:

> *"Students without technological competence will not have equal opportunity to achieve, and (they) will not learn how to survive in a technological world."*
> – Library educator, Pennsylvania

And another wrote:

> *"The dominance of technology will lead to further stratification in society – a new set of haves and have nots – and another set of social problems will ensue."*
> – Classroom teacher, Missouri

If schools lack or have only small numbers of microcomputers, VCR's, or CD ROM's, students won't learn the skills required in the future. They will lack access to the latest software, and the information available online and on CD ROM. Opportunities for future jobs and careers will be limited. Most of the panelists felt that students will be hampered by tight school budgets, though a number of them felt that funds will be found to purchase necessary hardware and software. Others said that teachers will manage somehow to cope with the problem.

A major question remains: What impact will a new class of illiterates have on society?

Teachers' Attitudes Toward Technology

The Delphi respondents expressed wide views on the growing use of new technology in the classroom. Comments ranged from absolute conviction ("The great majority – perhaps 90% – of classroom teachers will be using this technology directly and indirectly in their classrooms for both computer-assisted and computer-managed instruction.") to complete irritation ("I hate all this technology. I wish it would not happen.").

The majority of comments fell somewhere between these extremes. A sense of excitement about what new technology made possible was balanced by a concern that a number of teachers would continue to "misuse or abuse" new technology.

In the final round, 70% of the respondents felt that one half of all teachers will be actively using computers in the 90's. But it was also felt that this percentage can be increased if teacher resistance can be reduced.

Most respondents felt that negative attitudes expressed by teachers were based on fear or uncertainty, and that unless their concerns can be resolved, teachers will not realize the full potential of new technology.

Teacher resistance probably rises when there is:

- unfamiliarity with the hardware,
- dissatisfaction with the software available,
- a lack of experience, and a lack of time to use and experiment with new technology,
- an uneasy sense that all these new developments will increase a teacher's workload.

Participants were asked for suggestions for improving this situation. Some of the comments were: *"Teachers need to be made to feel professional and comfortable with technology."* Teachers also need time – *"time to experiment, to discover the marvels that technology can perform"* and *"time to play."*

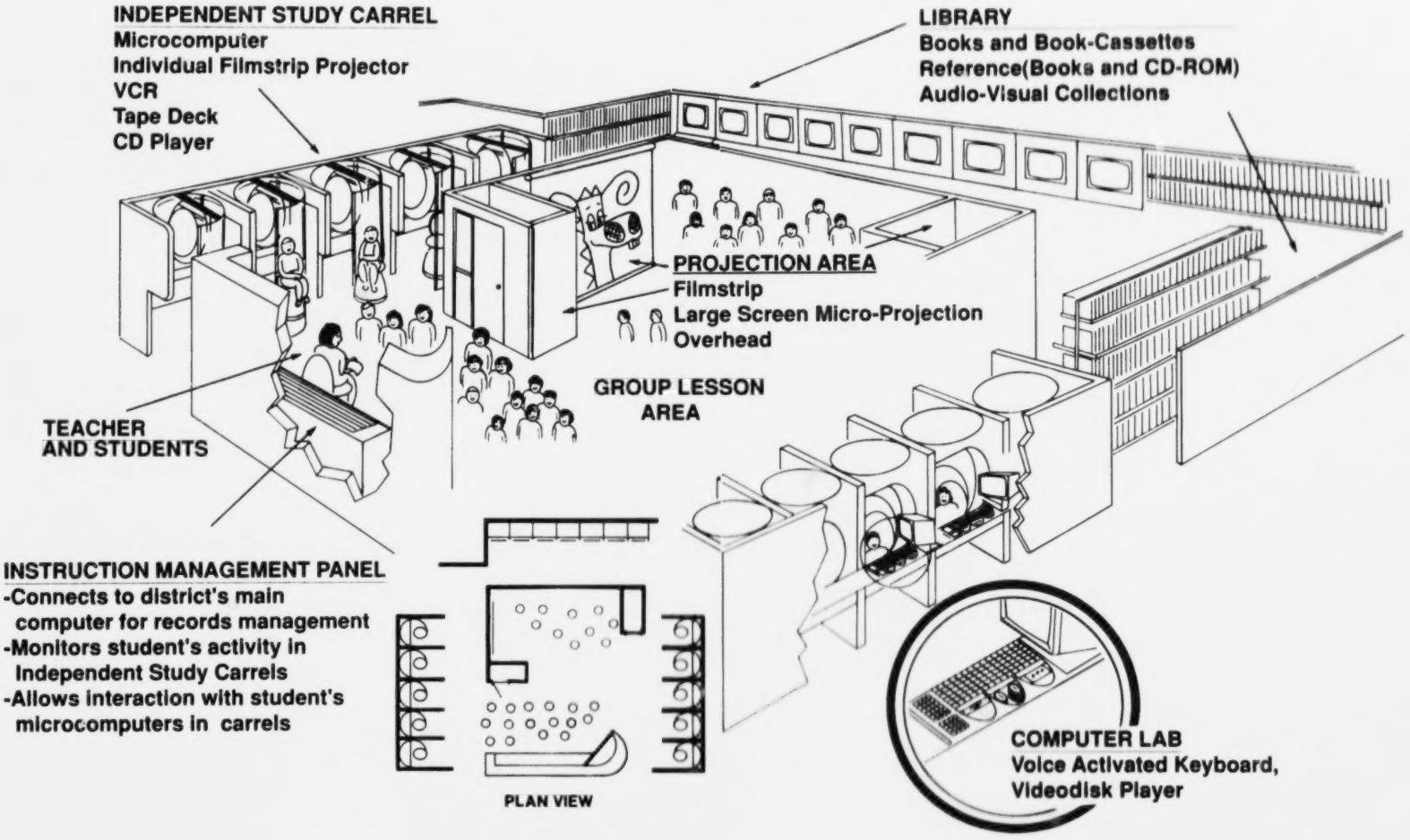
Specifically, the respondents recommended more education – both in regular teacher education courses and as part of in-service for the practicing teacher. This was seen as the single most important solution to educator resistance. Teachers also need to be reassured that "technology will not take over" but rather that in the hands of creative teachers, it will make teaching more rewarding.

Another important factor in the acceptance of new technology is a supportive administration that provides in-service courses and funds for special training, as well as opportunity for teachers to experiment with these new tools.

Teachers will also be encouraged to use the hardware if more effective software is developed. Software which is user-friendly and enhances the curriculum instead of replicating material now available in other media is what teachers want.

Though the panelists felt that some teachers will always distrust new technology, they agreed that these hold-outs will shrink in numbers with teacher turnover. A few participants observed that new technology will be so much a part of everyone's personal life in the 90's that it will become easier to use in professional life.

THE CLASSROOM OF THE YEAR 2000



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